इंटरनेट मानक

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IS 1448-87 (1979): Methods of test for petroleum and its products, Part 87: Autoignition temperature of liquid petroleum products [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

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IS : 1448 [P : 87] - 1979
Adopted : 1 January 1979
(Reaffirmed 2002)

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 87]

AUTOIGNITION TEMPERATURE OF LIQUID PETROLEUM PRODUCTS

UDC 665·6/·7-404 : 543·874

[*Adapted from ASTM Designation: D* 2155-66 (*Reapproved* 1976) *and ISO Standard* 3988]

1. SCOPE

1.1 This standard describes a method for the determination of the autoignition temperature of a liquid or semi-liquid petroleum product in air at atmospheric pressure using hypodermic syringe injection into a flask maintained at the test temperature.

Note — This standard should be used solely to measure and describe the properties of materials, products, or systems in response to heat and flame under controlled laboratory conditions and should not be considered or used for the description, appraisal, or regulation of the fire hazard of materials, products, or systems under actual fire conditions.

2. DEFINITION

2.1 Autoignition Temperature — It is defined as the temperature of spontaneous ignition of a petroleum product in the absence of a flame, under standardized conditions.

3. OUTLINE OF THE METHOD

3.1 A small measured sample of the product to be tested is injected with a hypodermic syringe into a heated 250 ml conical borosilicate flask containing air. The contents of the flask are observed in a darkened room for

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5 minutes following injection of the sample or until autoignition occurs; autoignition is shown by the sudden appearance of a flame inside the flask. The lowest flask temperature at which autoignition occurs for a series of prescribed sample volumes is taken to be the autoignition temperature of the petroleum product in air at atmospheric pressure.

4. APPARATUS

4.1 The apparatus, shown schematically in Fig. 1 to 6 shall conform to the requirements prescribed in **4.2** to **4.6**.

4.2 Furnace — Consisting of an approximately 127 mm internal diameter alundum cylinder, approximately 127 mm long, circumferentially wound with an electric heater; compressed asbestos-cement board cover, ring neck heater and flask guide ring; three neck heater supports; base heater; and suitable refractory insulating material and retaining shell. Temperature control shall be achieved by the use of suitable auto-transformers or rheostats, thermocouples and a suitable potentiometer.

4.3 Hypodermic Syringe — 0·25 or 1 ml capacity, graduated at every 0·01 ml and equipped with a 50 mm long stainless steel needle of 0·15 mm maximum bore diameter, to inject the sample into the heated test flask.

4.4 Test Flask — 250 ml capacity, conical flask made of borosilicate glass.

4.5 Thermocouples — Three calibrated base metal thermocouples, for example iron/constantan or copper/constantan, of 0·8 mm maximum diameter, to be used for determining the flask temperature. These shall be mounted in the furnace so as to contact the exterior wall of the flask 25 to 50 mm below the bottom of the neck heater and under the base of the flask near its centre.

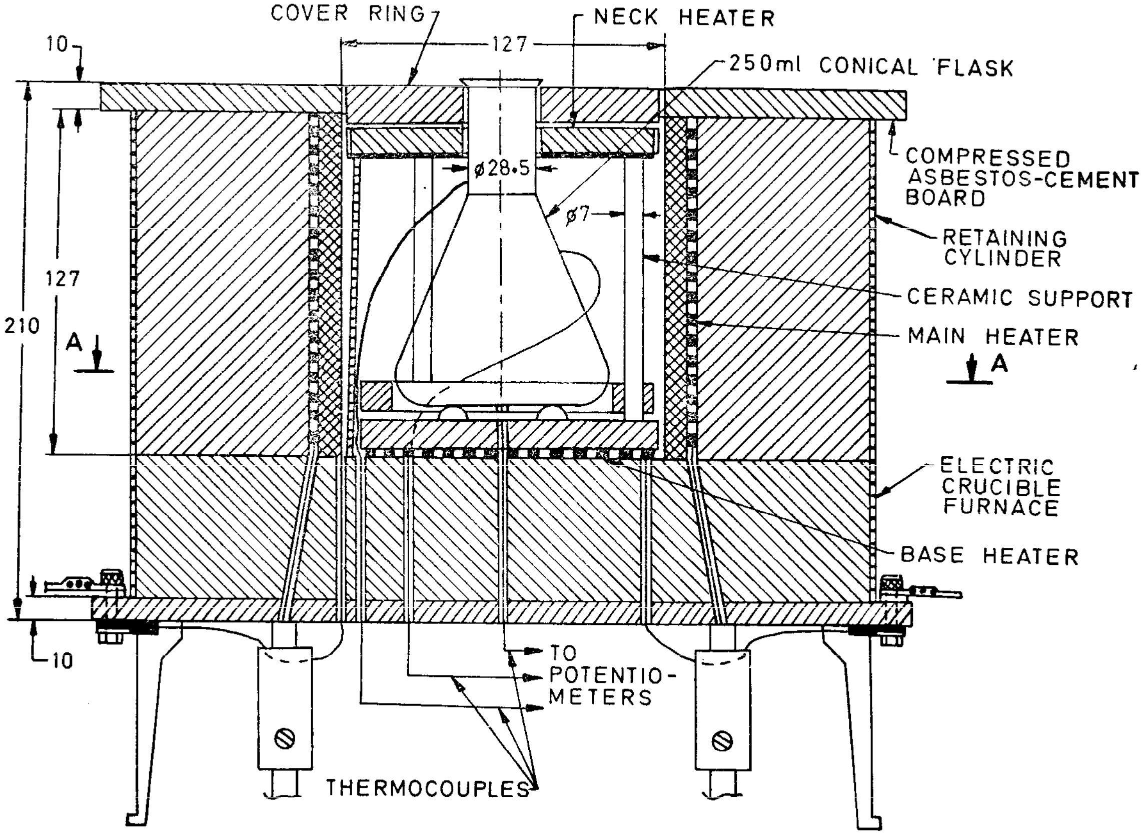
4.6 Timer — An electric timer or stopwatch calibrated in 0·1 or 0·2 seconds intervals shall be used to determine the time lag before ignition (time interval between the instant of sample injection and that of ignition as shown by the appearance of the flame).

5. PROCEDURE

5.1 Temperature Control — Adjust the temperature of the furnace so that the temperatures at the top, centre, and bottom of the test flask (*see* **4.4**) are within ± 1 °C of the desired test temperature.

5.2 Sample Injection — Inject 0·07 ml of the sample to be tested into the test flask with the hypodermic syringe (*see* **4.3**) and quickly withdraw the syringe (*see* Note).

Note — A new flask shall be used for tests on each product; should the flask become visibly coated with residue before the completion of tests on a product, the final series of tests shall be conducted with a new flask.



All dimensions in millimetres.

FIG. 1 TEST APPARATUS ASSEMBLY

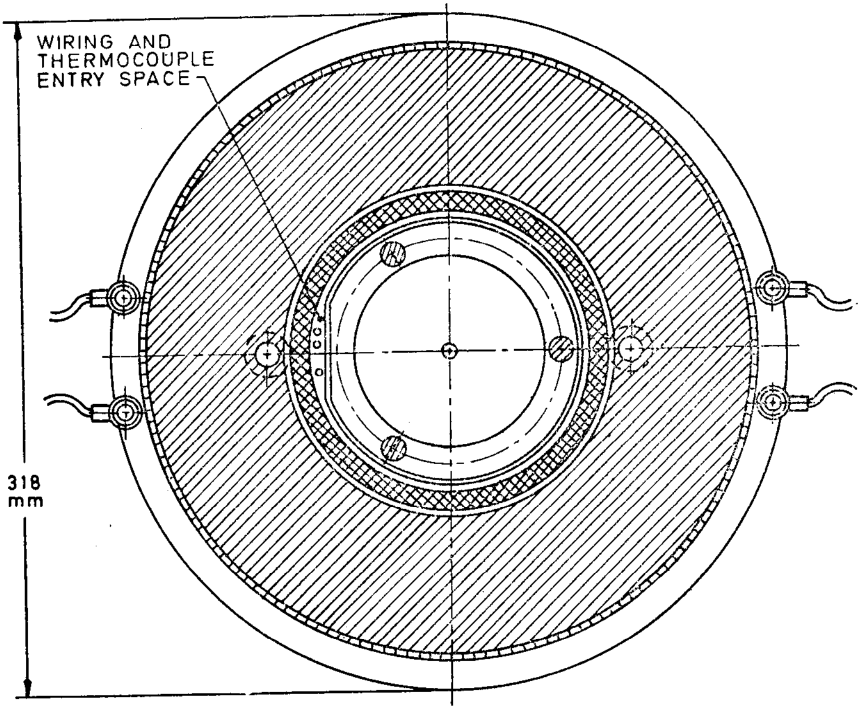
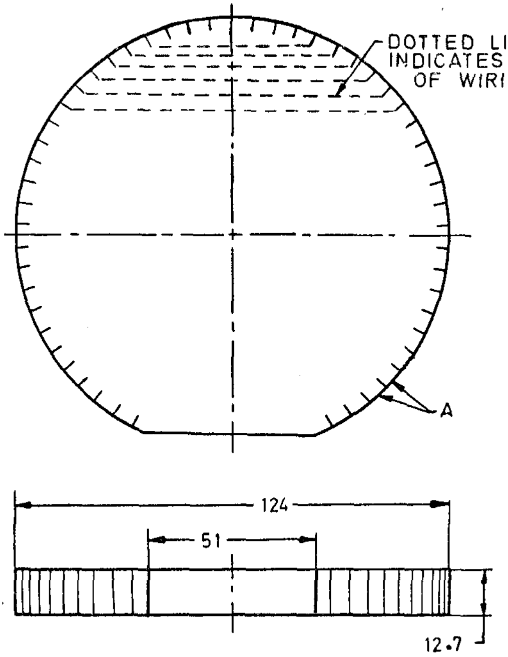


Fig. 2 Section AA (Flask Omitted)

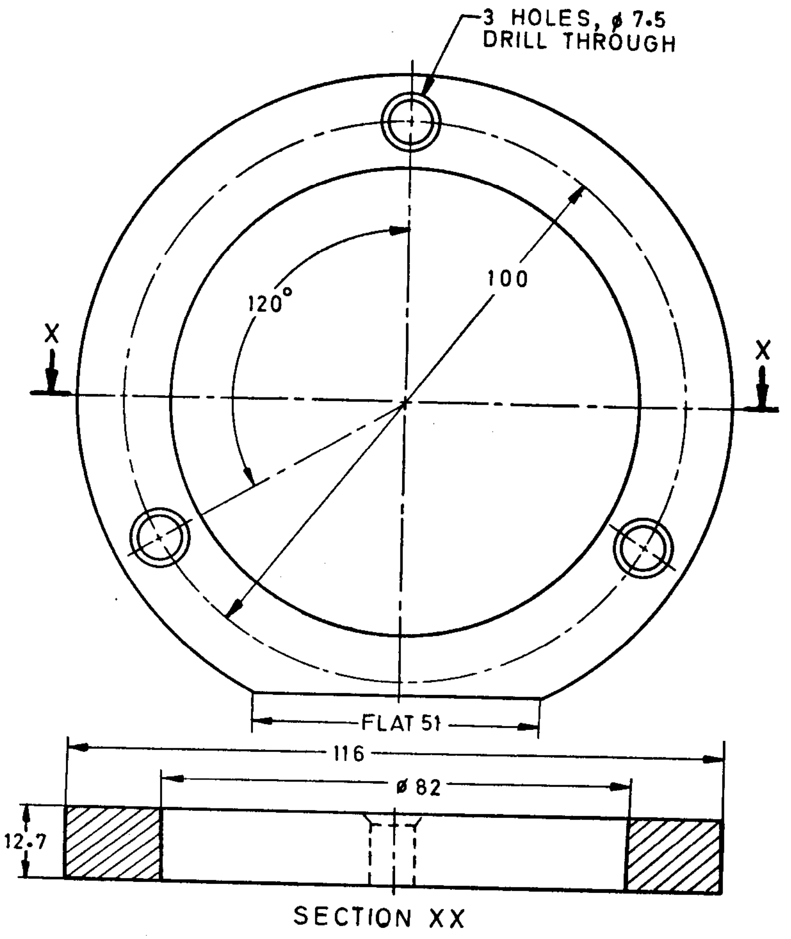


A = Grooves cut approximately 1·5 wide × 1·5 deep on outside diameter of disc. Nickel-chromium wire, length approximately 2 500, diameter 0·4

All dimensions in millimetres.

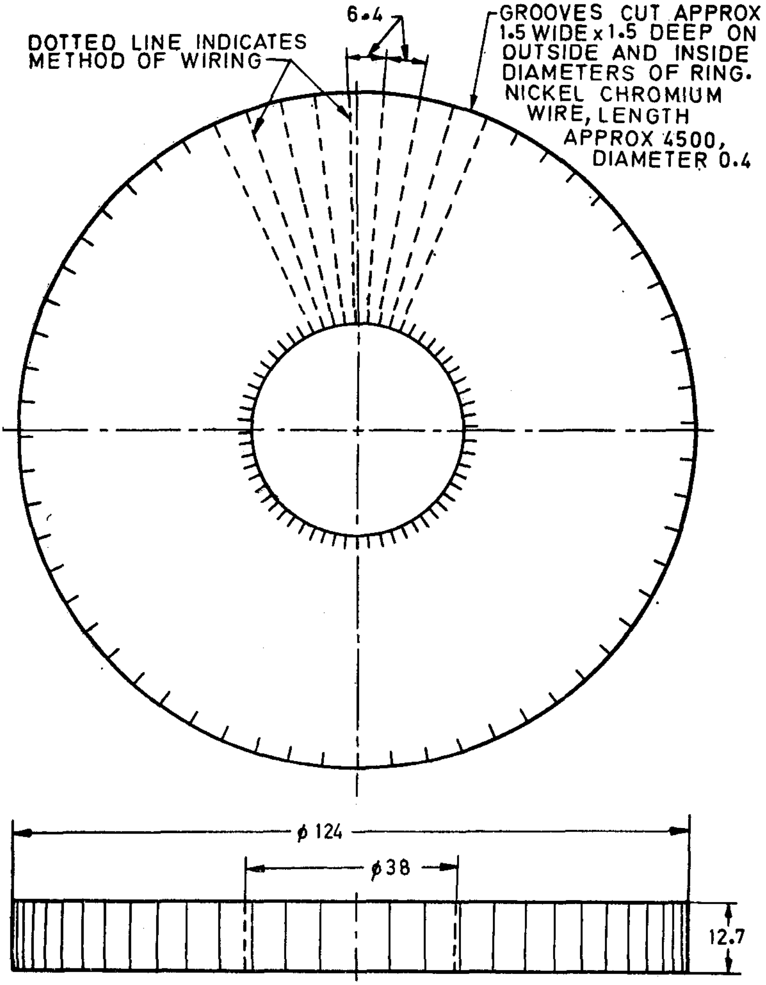
NOTE — The diameter of the nickel-chromium wire is based on a 110 V electricity supply. The diameter should be adjusted to suit the supply voltage, or a transformer used to convert the supply at the terminals to 110 V.

FIG. 3 BASE HEATER (COMPRESSED ASBESTOS-CEMENT BOARD)



All dimensions in millimetres.

FIG. 4 FLASK GUIDE RING (COMPRESSED ASBESTOS-CEMENT BOARD)


6.4
DOTTED LINE INDICATES METHOD OF WIRING
GROOVES CUT APPROX 1.5 WIDE x 1.5 DEEP ON OUTSIDE AND INSIDE DIAMETERS OF RING. NICKEL CHROMIUM WIRE, LENGTH APPROX 4500, DIAMETER 0.4
ϕ 124
ϕ 38
12.7

All dimensions in millimetres.

FIG. 5 NECK HEATER (COMPRESSED ASBESTOS-CEMENT BOARD)

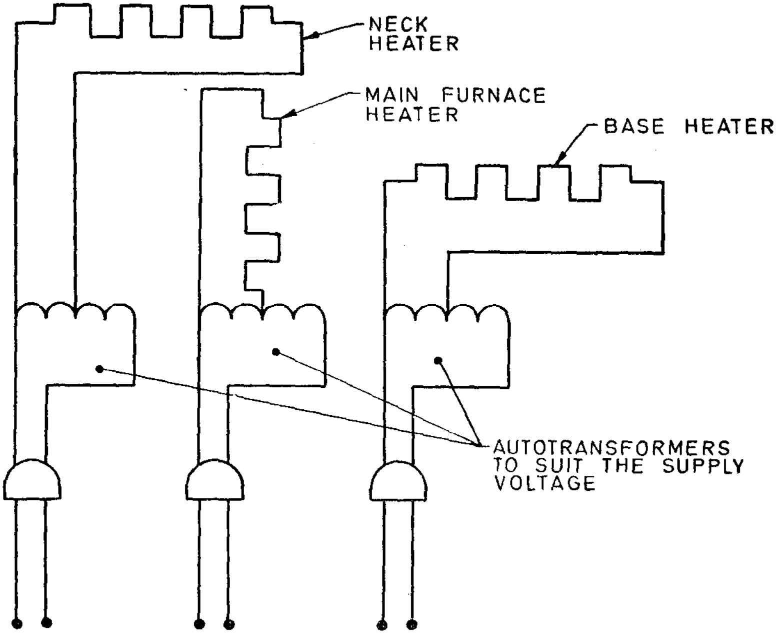


Fig. 6 Furnace Heater (Schematic Wiring Diagram)

5.3 Time Measurement — Start the timer (*see* **4.6**) as the sample is injected into the test flask.

5.4 Observations — Observe the inside of the test flask in a darkened room by means of a mirror placed at an appropriate angle above the flask. If a flame is not observed in 5 minutes, the volume of the sample tested is considered non-flammable at the temperature of the test flask. Completely flush the flask with clean dry air and stop the timer. Then repeat the test at a higher (about 30°C) temperature. Allow at least 15 minutes to elapse between tests. If a flame is observed, stop the timer and record the time interval between the sample injection and the appearance of the flame to the nearest 0·2 seconds as the time lag. Lower the test temperature by 3°C and repeat the entire procedure until autoignition is no longer obtained. Then raise the test temperature by about 30°C and repeat the above procedure using 0·10 ml of the sample. If the lowest temperature at which autoignition is obtained with this quantity of sample (0·10 ml) is lower than that found in the previous test, repeat the procedure again using 0·12, then 0·15 ml, etc, of the sample in 0·02 to 0·03 ml steps until the minimum autoignition temperature is obtained. If the lowest temperature at which autoignition is obtained with 0·10 ml of the sample is greater than that obtained with 0·07 ml of the sample, repeat the above procedure with 0·05 then 0·03 ml instead of 0·12, 0·15 ml, etc.

5.5 Autoignition — Autoignition is usually shown in these tests by the appearance of a yellow or blue flame. However, pale blue, white, red, or mixed colour flames may be obtained in some cases.

5.6 Data — Record the test temperature, atmospheric pressure, quantity of sample used, and time lag before ignition. A plot of the ignition temperature against time lag before ignition may be used to determine the autoignition temperature, if desired.

6. REPORT

6.1 Report the autoignition temperature as the lowest flask temperature at which autoignition was obtained, rounded to the nearest 3°C; report the corresponding time lag before ignition and barometric pressure as the time lag and pressure, respectively.

7. PRECISION

7.1 Results of duplicate tests shall not differ by more than the following amounts:

Temperature	*Repeatability*	*Reproducibility*
Below 316°C	3	10
Above 316°C	5	20